# **Technology Opportunity**

# Optical Surface Contouring for Nondestructive Inspection of TurboMachinery

The National Aeronautics and Space Administration (NASA) seeks to transfer a new noncontact gauging instrument that has been proven to measure the surface profile of solid objects.

### **Potential Commercial Uses**

- Nondestructive evaluation
- Manufactured part inspection

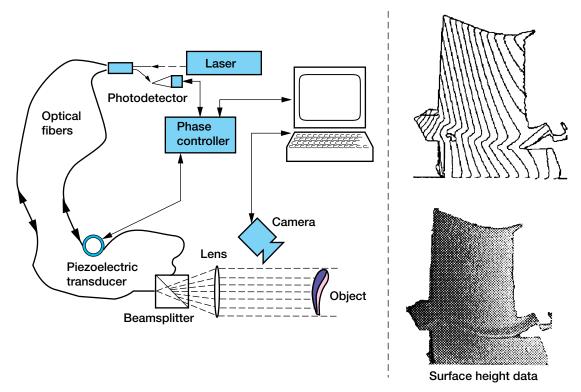
#### **Benefits**

- Relatively insensitive to vibrations and thermal disturbances
- · Low cost, low weight, and small volume

- Full field measurement—can measure a million points at once
- · Automated data reduction

# The Technology

A noncontact gauging instrument has been developed to measure the topography of solid objects. Optical fibers are used to project a striped-light pattern onto an object, and phase-stepping interferometry is used to measure the surface height of the object at each point in the field of view. A closed-loop fiber-optic phase controller provides accurate 90° phase steps to accurately and automatically determine the surface height from several images



Optical configuration for fiber-optic contouring instrument.



recorded by a solid-state camera. With this instrument, objects ranging from several millimeters square to several meters square can be measured with an accuracy of about 1/2000 of the field of view. This instrument works best on relatively smooth objects with a matte, light-colored surface but has been demonstrated to work on metallic objects. The object to be measured must remain motionless for the time it takes to record several images.

## **Options for Commercialization**

One of NASA's missions is to commercialize its technology. One aim of the NASA Lewis Research Center is to commercialize this fiber-optic controller for shape measurement, covered under U.S. Patent Number 5,146,293. Lewis' Commercial Technology Office is currently working with one small company to develop a commercial product for in situ aircraft engine inspections. We also will work with other interested industrial partners to test and evaluate this technology for other industrial applications. Any company wishing to license this technology may do so provided it has a sound business plan with a high potential for success.

### **Contacts**

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# **Key Words**

Contouring Gauging Profilometry Phase shifting Interferometry

